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ABSTRACT

Using a semantic mapping technique for vocabulary instruction, a study explored how children of diverse groups bring different cultural backgrounds and prior knowledge to tasks involved in learning new words. The study was conducted in three sixth-grade classrooms--one containing rural Native American (especially Menominee) children, another containing inner-city Black children, and the third containing suburban Caucasian children. The 20 words chosen for semantic mapping instruction were chosen from four categories: animals, recreation, health care, and environment. It was anticipated that the subjects would learn the vocabulary words by relating the target words to words already in their vocabularies. One 30-minute semantic mapping vocabulary lesson was taught each of four days. Analyses were done through interview procedures designed to examine the linkages between cultural background, prior knowledge, and the acquisition of new vocabulary. Measures of dominance indicated that (1) Caucasian subjects offered the highest average number of categories per map on all maps, and the highest average number of words on all but the health care map; (2) Black subjects offered the lowest average number of categories on all maps, and the lowest average number of words on all but the environment map; and (3) Native American subjects offered the highest number of words on the health care map, and the lowest average number of words on the environment map. (Appendixes include the semantic maps, the validation test and directions for administration, a sample lesson plan for animals, the interview protocol, and the retention test.) (HOD)

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AN INVESTIGATION OF THE RELATIONSHIPS BETWEEN PRIOR KNOWLEDGE AND VOCABULARY DEVELOPMENT WITH CULTURALLY DIVERSE STUDENTS

by

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Abstract

This study examined the resources and processes used by children of different cultural groups as they engaged in vocabulary development. Using semantic mapping as the instructional treatment, microscopic analyses were done through interview procedures designed to examine the linkages between cultural background, prior knowledge and the acquisition of new vocabulary. The study was done with Native American, inner-city Black, and suburban Caucasian students to establish and utilize procedures for identifying and analyzing differences in vocabulary processes as they relate to cultural background. Subjects received group vocabulary instruction and then were individually interviewed to determine relationships between prior knowledge and vocabulary acquisition.

Introduction

A study was conducted at the Wisconsin Center for Education Research as part of the project on the "Investigation of the Relationships Between Prior Knowledge, Vocabulary Development, and Passage Comprehension with Culturally Diverse Students" which sought to examine the resources and processes employed by intermediate grade level children of different cultural groups as they engaged in vocabulary acquisition. The subjects for the study were sixth-grade Native American, inner-city Black, and suburban Caucasian students. The two primary research questions were:

1. What kinds of cultural background differences are related to vocabulary acquisition?
2. How do children use their different storehouses of prior knowledge to expand their vocabularies?

Specialists in semantics, linguistics, and anthropology familiar with Native American (especially Menominee) and inner-city Black cultures served as consultants during the study design. The following consultants assisted in the development of probe strategies, response analysis, and aspects of cultural background:

Ms. Carol Dodge, Assistant Superintendent, Menominee Indian School District

Professor Cora Marrett, University of Wisconsin, Department of Sociology and Afro-American Studies

Professor William S. Hall, University of Maryland, Department of Psychology

Review of Related Literature

Researchers who looked at how words are stored in and retrieved from memory found some intriguing learning characteristics related to vocabulary acquisition. A phenomenon termed clustering was found in one list-learning study (Bousfield, 1953). Subjects who were given a list of randomly arranged items recalled the items in a cluster or "a sequence of associates having an essential relationship between its members" (p. 229). Tulving and Pearlstone (1966) reported that cues that tapped clustering aided subjects' accessibility to words in memory.

Another group of studies indicated that chunking of several clusters of words improved subjective cluster recall (Bower, Lesgold, & Tieman, 1969). Perfetti and Goodman (1970) identified an extended application of the phenomena of clustering or chunking. They concluded that it was "likely that the semantic richness of sentences leads to the activation of a larger set of semantic properties" (p. 423). In other words, readers utilize semantic relations between and among words as a strategy for disambiguating words in sentences.

These types of research findings led some investigators to develop models that would represent what seemed to be happening inside subjects' heads as they processed words and longer discourse. The work of Collins and Quillian (1969, 1970) generated several information processing hypotheses. Two are the Subway Map Model and the Spreading Activation Model (1970). A 1975 study by Collins and Loftus reinforced the belief that something like spreading activation does take place when people

process words, sentences, and prose.

Are there advantages to using teaching strategies that capitalize on categorically arranged conceptual frameworks to increase general vocabulary? Research suggests that the strategy helps retrieve known words or concepts--whether isolated or in context. One might extend the logic to say that these strategies would facilitate new word learning. If readers do categorize and map information in memory, the educational implication is that teaching and learning new vocabulary would be facilitated by employing strategies which capitalize on these features.

Exploiting experiences as a way of teaching vocabulary is not a new idea. A number of writers have stressed the importance of providing children with experiences and relating those experiences to vocabulary concepts (Carroll, 1964; Dale, 1965; Dolch, 1953; O'Rourke, 1974). The method is recommended extensively in the literature (Harris & Smith, 1976; Herber, 1978; Johnson & Pearson, 1978; Smith & Johnson, 1980; Spache & Spache, 1977) though there has as yet been no empirical verification.

The importance of prior knowledge in vocabulary acquisition and development is illustrated by studies which investigate vocabulary development of various cultural groups.

Findings reported by Phillion and Galloway (1969) suggest that children make different uses of their information storehouses of prior knowledge (which in turn appear to be affected by cultural background) as they expand their vocabularies.

Evidence of cultural diversity in language development, experiential

background, and various other elements of growth and learning have long been reported. For example, as early as 1932, Bartlett demonstrated that different cultural heritages affected comprehension in his "The War of the Ghosts" study. During recall (in some cases up to ten years later), Bartlett found that subjects modified the story to a retelling consistent with their own culture.

In another study, Kintsch and Greene (1978) asked a group of American college students to recall two stories: a Grimm's fairy tale, and an Apache Indian tale. Subjects recalled the sequencing of the Grimm's tale more easily than the Apache Indian tale.

Steffensen, Jogdeo, and Anderson (1978) studied two groups of subjects from different cultural backgrounds: Asian Indians and Americans. Subjects were asked to read two letters with similar organizations; one describing an Indian wedding and the other an American wedding. Results showed that both groups read the letter dealing with their own cultural background faster and recalled more of the culturally familiar text.

A bi-cultural study was conducted by Reynolds, Taylor, Steffensen, Shirey, and Anderson (1981). Inner-city black, white, and rural white eighth grade subjects were asked to read and recall a letter about a "sounding event." Sounding, a Black term, is a form of ritual insulting. It was hypothesized that the inner-city black subjects would recall the passage in a manner consistent with their culture, while the white subjects would distort it. This was found to be true.

Studies which deal with the area of metacognition are also relevant to the questions under study here. One study which used personal

interviews to assess children's metacognitive knowledge about memory found that third and fifth-grade children appear more planful and self-aware than kindergarten and first-grade children in their knowledge of how certain classes of variables, such as amount of study time and relations among items, interact to affect the quality of an individual's performance on a retrieval problem (Kruetzer, Leonard, & Flavell, 1975).

Several Soviet studies in the psychology of learning and teaching of mathematics used periodic interviews to investigate the global processes of long-term learning. Students at different developmental levels were asked to retrospect and explain which procedures they used to solve specific problems. Another methodology involved asking students to think aloud while completing a given problem (Menchinskaya, 1969; Kalmykova, 1966).

Nisbett and Wilson (1977) caution against accepting verbal reports of mental processes. They argue that people who are asked to report how a particular stimulus influenced a particular response, "do so not by consulting a memory of the mediating process, but by applying or generating causal theories about the effects of that type of response. They simply make judgements, in other words, about how plausible it is that the stimulus would have influenced the response." The researchers concede, however, that "the culture or a subculture (sic) may have explicit rules stating the relationship between a particular stimulus and a particular response . . . and the culture or a subculture may supply implicit theories about causal relations"

(p. 248). Whether subjects actually report on their mental processes or, as Nesbitt and Wilson suggest, rely on culture specific rules and theories, either will ascertain or reflect relationships between prior knowledge, vocabulary development, and culture.

Study Focus and Design

This study examined the resources and processes employed by children of different cultural groups as they engaged in vocabulary development. The primary questions are:

1. What kinds of cultural background differences are related to vocabulary acquisition?
2. How do children use their different storehouses of prior knowledge to expand their vocabularies?

The study explored how children of diverse groups bring different cultural backgrounds--and prior knowledge stores--to tasks involved in learning new words. Learning occurs when new concepts and new knowledge are attached to what is already known. This integration of the new with the known enables understanding. For example, an understanding of the concept transplant can be achieved by relating the new concept to such concepts as tree, growth and others already known. It is not yet known precisely how these processes work, nor how they might differ in relation to diverse backgrounds. However, the instructional technique of semantic mapping does reveal prior knowledge that children have about a topic, while at the same time helping children to acquire new words by relating these words to prior knowledge.

The study employed a semantic mapping technique in vocabulary instruction. The instruction was followed by individual interviews with children to determine the background knowledge tapped and the processes used to learn new vocabulary by linking it to prior knowledge.

Semantic mapping is a categorical structuring of information in graphic form. It is an "individualized" content approach which allows students to relate new words to their own experiences and prior knowledge. A completed semantic map provides the teacher information about what a student knows and reveals anchor points upon which new concepts can be introduced.

The general instructional sequence for semantic mapping is:

1. Select a word (topic) of classroom interest or need (such as a word central to a story to be read).
2. Write the word on the chalkboard.
3. Ask the students to think of as many related words as they can and to write them on paper in categories.
4. Have individuals share the words they have written. Write them on the board and attempt to put them into categories.
5. Then, number the categories and have the students name them. For example:
    1. Bad Things That Can Happen To Our Environment
    2. What We Can Do To Save Our Natural Resources
    3. People Or Things That Harm Our Environment
    4. Things To Conserve
    5. Ways To Conserve
    6. Why People Don't Conserve

A completed map for "conservation" might look like the one shown in Figure 1.

The study was conducted in three sixth-grade classrooms--one comprising rural Native American (Menominee) children, one comprising inner-city Black children, and one comprising suburban Caucasian children. All three population groups were from Wisconsin.

The four topics chosen for semantic mapping instruction were--Animals, Recreation, Health Care, and Environment (see Appendix A: Semantic Maps). Prior to instruction a 41-item validation test was administered to three groups of seventh-grade students (Native American--Menominee, N = 36; Black, N = 38; Caucasian, N = 38) from the same district attendance areas as the three sixth-grade treatment groups (see Appendix B: Validation Test and Directions for Administration). The purpose of the test was to determine twenty vocabulary words, five from each of the four topics which could be considered unknown vocabulary words for the three treatment groups. Words known by 43 percent or fewer of the seventh-grade students became the target words for the semantic mapping lessons.

The instructional materials were designed so that all subjects learned the same twenty target words. It was anticipated that the subjects in the three cultural groups would learn these words by "hanging them on different pegs," that is, by relating the target words to words already in their vocabularies. An example for the category trees follows.

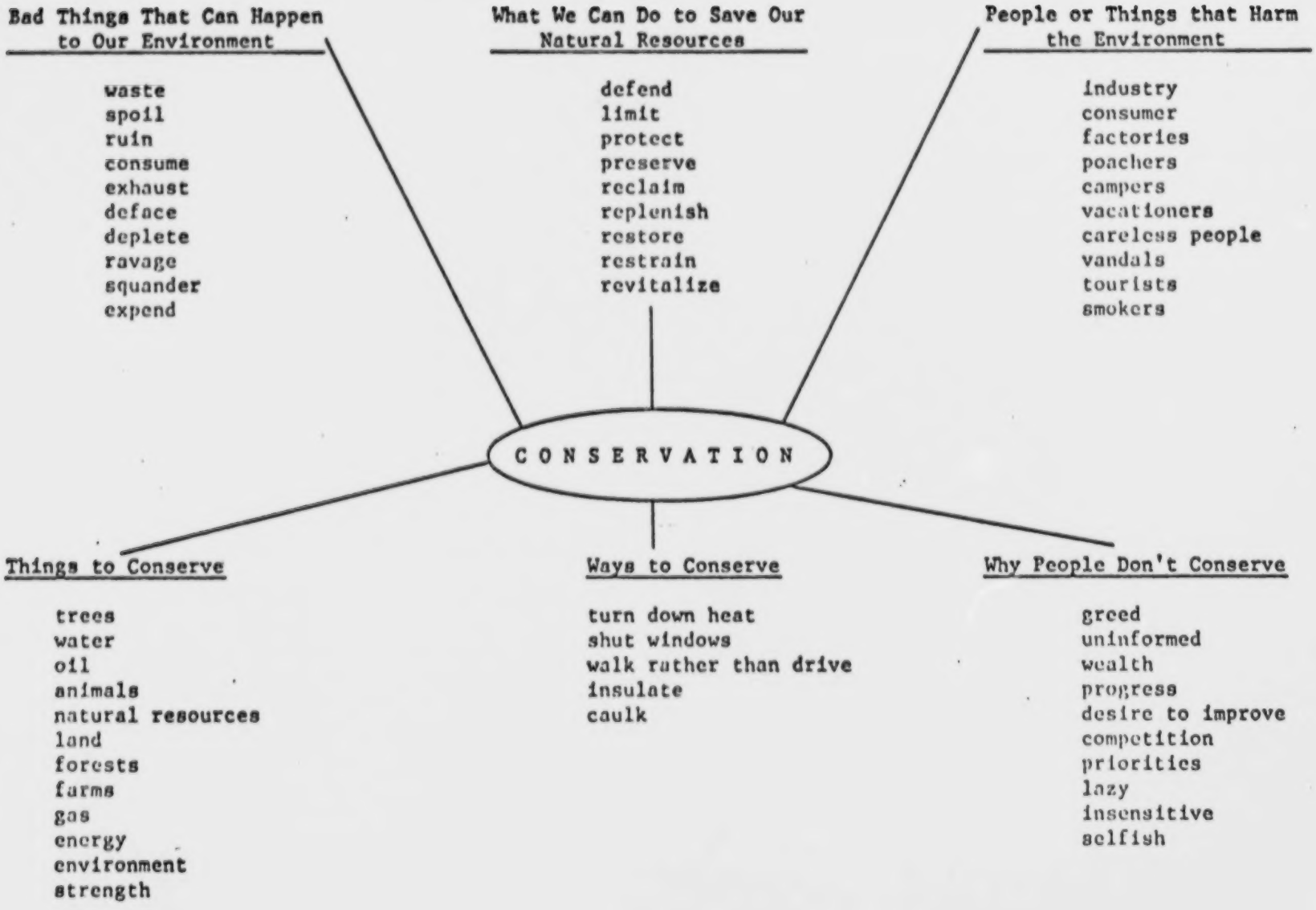

Figure 1. Semantic Map: Conservation

Category: trees

Target Words: product, deciduous, transplant, conserve, photosynthesis

Possible Words Generated by Native Americans: boom logger, sawmill, syrup, adze

Possible Words Generated by Inner-City Blacks: park, forest preserve, Christmas, grass, field trip

Possible Words Generated by Suburban Caucasians: backyard, arboretum, swing, raking, fertilize.

One 30-minute semantic mapping vocabulary lesson was taught each day during the first four days of a school week. The 30-minute lesson consisted of three subparts. On the first day the investigator conducted a 10-minute practice semantic mapping lesson to familiarize students with the procedures within this type of lesson. During the next 10-minute period, the first five target words were introduced in the context of the semantic map, Animals. Students were then given 10 minutes to work independently, adding words and categories to their maps. On the second day the first five target words were reviewed using the semantic mapping techniques. After this 10-minute review, the five target words for the second day were introduced, and again students were given independent work time. This procedure was followed for the remaining lessons (see Appendix C: Lesson Plan Sample--Animals).

Each 30-minute instructional period was followed by individual interviews with four subjects randomly selected from each classroom. A total of sixteen students from each group were interviewed. These

interviews were tape recorded. A set of probes was used to attempt to determine the source of elicited words and how subjects bridged these words to target words (see Appendix D: Interview Protocol). The Gates-MacGinitie Vocabulary Subtest and a 20-item vocabulary retention test (see Appendix E: Retention Test), which consisted of the target words taught the first four days of the week, were administered to the entire class on the fifth day (see Table 1).

Data Handling

During the post-instruction interview, students were requested to respond to two major questions which required them to report on their cognitive processes. First, they were asked to explain why they suggested their peculiar words, and second, whether they related those words to the target words. Analysis of these responses follow, in part, procedures used by Szalay and Deese (1978). The Szaly-Deese framework enables intragroup and intergroup comparisons regarding the number of unique and common responses.

They identified three qualities of continued associative responses--dominance, affinity and affectivity--from culturally diverse subjects. Dominance is the notion that certain concepts are more important within certain cultures than they are in others. Thus, certain words generate a greater number of responses than others. The measure of dominance is simply the rate at which subjects produce responses to a given stimulus or concept. Associative affinity deals with the similarity or commonality of response material within a group or between different groups.

Table 1

Instruction, Interview, and Assessment Schedule

for Three Sixth-Grade Classrooms

Monday	10-Minute Practice Semantic Mapping Lesson (Trees) 10-Minute Introduction of Target Words on Semantic Map (Animals) 10-Minute Independent Work on Semantic Map (Animals) Interview Four Students Randomly Selected From the Classroom
Tuesday	10-Minute Review of Semantic Map (Animals) 10-Minute Introduction of Target Words on Semantic Map (Recreation) 10-Minute Independent Work on Semantic Map (Recreation) Interview Four Students Randomly Selected From the Classroom
Wednesday	10-Minute Review of Semantic Map (Recreation) 10-Minute Introduction of Target Words on Semantic Map (Health Care) 10-Minute Independent Work on Semantic Map (Health Care) Interview Four Students Randomly Selected From the Classroom
Thursday	10-Minute Review of Semantic Map (Health Care) 10-Minute Introduction of Target Words on Semantic Map (Environment) 10-Minute Independent Work on Semantic Map (Environment) Interview Four Students Randomly Selected From the Classroom
Friday	10-Minute Review of Semantic Map (Environment) Administer Retention Test Administer Gates-MacGinitie Vocabulary Subtest

It can be used within a group as a measure of the relatedness of one stimulus word to another, or as a measure of the relatedness of one group's responses to another group's responses regarding a single stimulus word. Affectivity is a measure of the value (positive or negative) associated with certain words.

The data from each map as a whole yield the following measures of dominance:

the number of words students within each group mentioned per map topic,

the number of categories students within each group mentioned per map topic,

the type of category students within each group mentioned per map topic,

the number of subjects within each group who offered each category, and

the number of words students within each group mentioned per category.

In addition to the measures of dominance for the map as a whole, patterns of words within each category type were classified. The data from each category yield the following measures of dominance:

the number of students within each group who offered each classification, and

the number of words students within each group mentioned per classification.

These measures of dominance can be used to construct intergroup associative affinity indices which would reflect the level of similarity between groups. The dominance data consist of raw response frequencies.

Data from the following were handled descriptively:

the number of words students within each group mentioned per map,

the number of categories students within each group mentioned per map,

the type of category students within each group mentioned per map,

the number of words students within each group mentioned per category, and

the number of words students within each group mentioned per classification.

Chi squares were applied to the raw response frequencies of the remaining two measures of dominance to test for differences in response patterns among groups.

Other information determined from interview data has to do with the types of reasons offered for peculiar word choices and the associations involved in tying mentioned words to target words. Types of reasons offered for peculiar word choices include vicarious experience with a word, direct experience with a word, associative and unknown. A vicarious rationale includes experiences which lead to second-hand knowledge of a word, such as reading or discussion about a word, or seeing a picture or other representation of a word. A direct rationale includes any experiences which lead to first-hand knowledge of a word, such as observation of the real-life object or action a word represents, or personal involvement in an activity a word represents. An associative rationale occurs when students indicate that other words on their maps are the primary stimulus for a peculiar word. Unknown includes students'

inability to explain the reason for offering certain words. Students also indicated whether any of the words they added to the maps could help them remember any of the target words.

Interview data consist of response frequencies of types of reasons offered for peculiar word choices and associations involved in tying mentioned words to target words. Data were handled descriptively.

Results and Discussion

Measures of dominance indicate that Caucasian subjects offered the highest average number of categories per map on all maps, and the highest average number of words on all but the Health Care map (see Table 2). Black subjects offered the lowest average number of categories on all maps, and the lowest average number of words on all but the Environment map. Native American subjects offered the highest average number of words on the Health map, and the lowest average number of words on the Environment map.

There were seven Animal map categories common to two or more groups (see Table 3). Chi squares indicate significant differences in the number of students mentioning categories in two categories--Types of Animals and Habitat. The Caucasian group offered the category Types of Animals most, with Native American (Menominee) offering it least. Caucasian students were again high on Habitat, with Black students reporting this category least.

Additionally, significant differences were found among groups in the number of students who offered categories unique to their group. More Native American (Menominee) students offered unique categories

Table 2

Frequency of Responses to the Animal, Recreation,

Health Care and Environment Maps

Map Topic and Response	Native American (Menominee)	Black	Caucasian
Animals	(N = 15)	(N = 15)	(N = 24)
Total Words per Map	327	305	683
Average Words per Student	21.8	20.3	28.46
Total Categories per Map	23	26	76
Average Categories per Student	2.2	1.73	3.17
Recreation	(N = 17)	(N = 12)	(N = 24)
Total Words per Map	258	159	441
Average Words per Student	15.18	12	18.375
Total Categories per Map	30	18	65
Average Categories per Student	1.76	1.5	2.71
Health Care	(N = 14)	(N = 13)	(N = 22)
Total Words per Map	228	170	319
Average Words per Student	16.29	13.08	14.5
Total Categories per Map	35	20	61
Average Categories per Student	2.5	1.53	2.77
Environment	(N = 17)	(N = 13)	(N = 24)
Total Words per Map	213	168	368
Average Words per Student	12.53	12.92	15.33
Total Categories per Map	23	14	58
Average Categories per Student	1.35	1.08	2.42

Table 3

Classification and Frequency of Response per Category to the Animal Map

Name of Category	Native American (Menominee) (N = 15) Number of Students	Native American (Menominee) (N = 15) Percent of Students	Black (N = 15) Number of Students	Black (N = 15) Percent of Students	Caucasian (N = 24) Number of Students	Caucasian (N = 24) Percent of Students	Chi Square
Things Animals Do[a]	14	93.3	14	93.3	20	83.3	1.35
What Animals Use to Protect Themselves	15	100	15	100	21	87.5	3.97
Types of Animals	3	20	9	60	15	62.5	7.5*
Foods Animals Eat	9	60	7	46.67	14	58.33	.675
Habitat	3	20	2	13.3	12	50	7.02*
Parts of Animals	1	6.67	3	20	4	16.67	1.73
What Animals Need to Survive	1	6.67	1	6.67	0	0	1.61
Unique[b]	11	100	1	6.67	14	58.33	15.15*

[a]Although this category was preprinted on each student map, only the number of students who added words to this given category is shown.

[b]Unique categories are those reported by only one treatment group. In some cases an individual student offers more than one unique category, other times two or more students offer a category unique to their group.

*$p \leq .05$.

than Caucasian or Black students. Black students offered the fewest unique categories.

Examples of categories unique to the Native American (Menominee) group include, What People Make Out of Animal Skins, Things Animals Chase, Animals That Run Fast, What Animals Need to Adapt, and Animals That Adapt. Categories unique to the Black group were How Animal Teeth Are Made, How Animals Sleep and How Animal Skin Feel Like (sic). Categories unique to the Caucasian group include Habits, Science Terms, Races, and Sounds Animals Make.

Within the category Types of Animals there were nine researcher determined classifications; Woodland, Fish/Reptile, Backyard/Park, Pets, Farm, Jungle/Zoo, Exotic, Insects, and People. Chi squares of the number of students within each group who offered words which fit these specific researcher-determined classifications indicate that there were significant differences among groups in only the Jungle/Zoo classification. Black students reported Jungle/Zoo animals most frequently, with Native American (Menominee) reporting them least.

Data from twelve researcher-determined classifiations within one of the two preprinted map categories--What Animals Use to Protect Themselves--show differences in the number of students who offered words which fit these classifications. For example, 47 percent of Native American (Menominee) students offered the classification Fur as something animals can use to protect themselves. Neither Blacks nor Caucasians offered this classification. Also 53 percent of Native American (Menominee) students offered the classification Horns/Antlers, whereas only 17 percent of Caucasian students and no Black students

offered this classification. Differences in classifications such as body parts, teeth, and movements were less pronounced.

There were eight Recreation map categories common to two or more groups (see Table 4). Chi squares indicate significant differences in the number of students mentioning categories in four categories--Reasons for Recreation, Sports, Equipment, and Types of Recreation. The Caucasian group offered the categories Reasons for Recreation, Sports, and Equipment most, with Blacks offering them least. Additional statistical tests will have to be performed on the results from the Equipment category because three of the six expected frequencies are less than five. This may be because no Black students offered the category Equipment. Black students offered the category Types of Recreation most, with Caucasian students offering it least. Caucasian students tended to separate recreational activities more into categories such as sports, hobbies, plus additional unique categories rather than combining them within the Types of Recreation category.

Additionally, significant differences were found among groups in the number of students who offered categories unique to their group. More Caucasian students offered unique categories than Native American or Black students. Native American (Menominee) students offered fewest unique categories.

Examples of categories unique to the Caucasian group include Togetherness Recreation, Indoor Recreation, Outdoor Recreation, Names of Championships. Categories unique to the Black group are Things People Eat,

Table 4

Classification and Frequency of Response per Category to the Recreation Map

Name of Category	Native American (Menominee) (N = 15) Number of Students	Native American (Menominee) (N = 15) Percent of Students	Black (N = 12) Number of Students	Black (N = 12) Percent of Students	Caucasian (N = 24) Number of Students	Caucasian (N = 24) Percent of Students	Chi Square
Reasons for Recreation[a]	8	47.1	5	41.67	19	79.2	6.56*
Names for People with Hobbies[a]	12	70.59	8	66.67	14	58.33	.69
Sports	6	35.29	1	8.33	17	70.83	13.62*
Hobbies	3	17.65	2	16.67	11	45.83	5.09
Why People Like Recreation	2	11.76	1	8.33	1	4.16	.84
Types of Recreation	11	64.71	10	83.33	4	16.67	17.36*
Places for Recreation	0	0	1	8.33	4	16.67	3.25
Equipment	2	11.76	0	0	8	33.33	6.63*
Unique[b]	3	17.64	3	25	14	58.33	8.08*

[a]Although this category was preprinted on each student map, only the number of students who added words to this given category is shown.

[b]Unique categories are those reported by only one treatment group. In some cases an individual student offers more than one unique category, other times two or more students offer a category unique to their group.

*p ≤.05.

Things That Are Not Fun, What I Play, and Things Adults Do. Categories unique to the Native American (Menominee) group include Why Games Are Popular and How They Get Money Raised (sic).

Within one of the two preprinted categories--Reasons for Recreation there were five researcher-determined classifications; Pleasure, Health, Camaraderie, Economic, and Academic. Chi squares of the number of students within each group who offered words which fit these specific researcher-determined classifications indicate that there were significant differences among groups in only the Pleasure classification. Caucasian students reported pleasure reasons most frequently, with Black students reporting them least.

Data from researcher-determined classifications within the category--Kinds of Recreation--show differences in the number of students who offered words which fit these classifications. For example, 23 percent of Native American (Menominee) students offered the words hunt or trap, whereas only 8 percent of Blacks and no Caucasians offered these words. Native American (Menominee) students also offered words such as lacrosse, canoe riding, and rafting which neither Black nor Caucasian students offered. Differences in the number of students who offered words such as swimming, fishing, football, and baseball were negligible.

Data from the researcher-determined classifications within the category--Places for Recreation--show differences in the kinds of responses even though 17 percent of both Black and Caucasian students suggest words that fit the classifications. Black students tend to suggest recreational facilities such as YMCA or school, whereas

Caucasian students suggest geographic locations such as Miami, San Diego, Washington, D.C., and Great America (Gurnee, Illinois). There were no Native American (Menominee) students who suggested the category--Places for Recreation.

There were thirteen Health Care map categories common to two or more of the treatment groups (see Table 5). Chi squares show significant differences in the number of students mentioning categories in four categories--Medicines, How You Get Sick, Kinds of Sicknesses, and Wellness Maintenance. Caucasian students offered the categories How You Get Sick, Wellness Maintenance, and Kinds of Sicknesses most. Native American (Menominee) students offered the category Medicines most, and did not offer the category Wellness Maintenance. Black students did not offer the categories Medicines, How You Get Sick or Kinds of Sicknesses. Because each of these categories was common to only two treatment groups with zeroes reported in the remaining cells results should be viewed cautiously.

Additionally, there were no significant differences among groups in the number of students who offered categories unique to their groups.

There were eight Environment map categories common to two or more groups (see Table 6). Chi squares indicate significant differences in the number of students mentioning categories in two categories--Things in the Environment, and Animals in the Environment. Native American (Menominee) students offered the category Things in the Environment most, with Black students offering it least. Although Caucasian students offered the category Animals in the Environment most, results

Table 5
Classification and Frequency of Response per Category
to the Health Care Map

Name of Category	Native American (Menominee) (N = 14) Number of Students	Native American (Menominee) (N = 14) Percent of Students	Black (N = 13) Number of Students	Black (N = 13) Percent of Students	Caucasian (N = 22) Number of Students	Caucasian (N = 22) Percent of Students	Chi Square
How You Feel When You're Sick[a]	14	100	13	100	18	81.82	5.35
What You Do When You're Sick[a]	14	100	13	100	21	95.45	1.25
Cures	2	14.29	1	7.69	2	9.09	.37
What You Eat When You're Sick[a]	0	0	3	23.07	2	9.09	3.97
Health Food	0	0	3	23.07	6	27.27	4.51
Wellness Maintenance	0	0	2	15.38	10	45.45	10.35*
Where You Go When You're Sick	3	21.43	0	0	3	13.64	2.95
Medicines	8	57.14	0	0	7	31.82	10.39*
How You Get Sick	1	7.14	0	0	7	31.82	7.27*
Kinds of Sicknesses	4	28.57	0	0	9	40.91	7.06*
Health Care Personnel	1	7.14	0	0	3	13.63	2.05
What You Do When You Go to the Doctor	1	7.14	0	0	2	9.09	1.21
Things That Happen When You're Sick	2	14.29	3	23.07	0	0	5.11
Unique[b]	6	42.86	7	53.85	5	22.72	3.72

[a]Although this category was preprinted on each student map, only the number of students who added words to this given category is shown.

[b]Unique categories are those reported by only one treatment group. In some cases an individual student offers more than one unique category, other times two or more students offer a category unique to their group.

*p ≤.05.

Table 6

Classification and Frequency of Response per Category to the Environment Map

Name of Category	Native American (Menominee) (N = 17) Number of Students	Native American (Menominee) (N = 17) Percent of Students	Black (N = 13) Number of Students	Black (N = 13) Percent of Students	Caucasian (N = 24) Number of Students	Caucasian (N = 24) Percent of Students	Chi Square
Things People Do to the Environment[a]	12	70.59	13	100	19	79.17	4.38
Events That Change the Environment[a]	10	58.82	11	84.61	16	66.67	2.34
Things in the Environment	9	52.94	1	7.69	8	33.33	6.79*
Pollution	1	5.88	1	7.69	3	12.5	.57
What People Do to the Environment	1	5.88	2	15.38	5	20.83	1.77
Animals in the Environment	0	0	2	15.38	12	50	13.95*
Types of Environments	2	11.76	0	0	1	4.17	2.10
How to Keep the Environment Clean	1	5.88	1	7.69	0	0	
Unique[b]	8	47.06	5	38.46	13	54.17	.84

[a]Although this category was preprinted on each student map, only the number of students who added words to this given category is shown.

[b]Unique categories are those reported by only one treatment group. In some cases an individual student offers more than one unique category, other times two or more students offer a category unique to their group.

*p ≤.05.

should be viewed cautiously because no Native American (Menominee) students responded to this category. There were no significant differences among groups in the number of students who offered categories unique to their group.

During the follow-up interviews students were asked to tell how they thought of the words which they added to their maps. The researcher categorized their responses as direct, vicarious, associative, or undetermined knowledge of the source of their words. Native American (Menominee) students offered a higher percentage (45 percent) of direct knowledge of woodland animal names, than either Black (13 percent) or Caucasian (28 percent) students. In other words, if Native American (Menominee) students suggested the word bear they were more likely to have actually seen a bear than Black or Caucasian students. Native American (Menominee) students also offered the highest percentage 21 percent) of associative knowledge, with Caucasian and Black students offering eight and seven percent respectively. While reporting how he thought of words on his Animal map one Black student gave the following response which indicates associative knowledge of the words. "Cause my dog, he needs food and water and a home to live in so I put food, water, home, protection." A Caucasian student when asked how he thought of teeth said, "Well, most animals have teeth, so I just figure, like dogs, they bite, and cats." A Native American (Menominee) student who listed names of animals on her Animal map, suggested kinds of foods each of these animals might eat. This is another example of associative knowledge of word source.

Black students reported the highest percentage (73 percent) of vicarious knowledge of woodland animal names, with Caucasian and Native American (Menominee) students reporting 24 percent and 7 percent respectively. When asked how he thought of the word quills a Black student gave the following respons which indicates vicarious knowledge of the word, "I just thought of a porcupine, I never saw one of them . . . cause I had saw a porcupine in a book, a dog was trying to eat it and it shot its mouth full of thorns." When another Black student was asked how he thought of deer he said, ". . . I saw this picture on Channel 10 about these men that were hunting deer."

Both Native American (Menominee) and Caucasian students report 100 percent direct knowledge of farm animal names, with Black students reporting 83 percent. When asked how they thought of words which named pets, students in all groups reported over 80 percent direct knowledge of the words. Native American (Menominee) students report 100 percent vicarious knowledge of jungle/zoo words, with Black and Caucasian students reporting 38 percent and 22 percent respectively.

During the second stage of the interview students were asked to report if any of the words they had added could help them learn the target words. Based on information from the animal map interviews, it was found that students in all three groups were more likely to associate a target word to words with which they've had direct knowledge.

Fifty-eight percent of the words Native American (Menominee) students associate with target words are words with which they've had direct knowledge. Black students make 50 percent direct knowledge associations,

with Caucasian making 45 percent direct knowledge associations. Caucasians report the highest vicarious knowledge associations (20 percent), with Blacks and Native Americans (Menominee) reporting 18 and 0 percent respectively. Native American (Menominee) students report the highest number of associative knowledge associations (33 percent), with both Caucasians and Blacks reporting 30 percent. Responses which indicated that students couldn't offer a rationale for the source of their words were less than 9 percent in each of the groups.

Additional analyses of data from the second stage of the follow-up interviews suggest that both Caucasian and Black students are more likely to correctly recall a target word if they associated it with one or more of the words on their maps. Specifically, sign tests were performed to determine whether there was a relationship between association and correct response to target words. Data from the Native American (Menominee) group show no significant relationship between association and correct response on the retention test. This is true for the aggregate data from the four map interviews as well as for each map individually. For Black students there is a significant relationship when responses for all maps are analyzed together but when analyzed individually significant relationships are found only for the Health Care and Animals maps. Because three students were absent for the retention test the N was too small to perform the sign test on data from the Environment map individually. Data from the Caucasian group show significant relationships between association and correct responses to target words for all maps individually and together.

Chi square was used to determine potential differences among groups on associations between target words and student-generated words, and on correct response to retention test items (see Table 7). Chi squares indicate differences among groups on both associations and correct response. Cuacasian students are high on both associations and correct response. Native American (Menominee) students are low on associations. Black students and Native American (Menominee) students are within .33 percent of each other on correct response to retention test items.

A brief summary of results for the Validation, Retention and Gates-MacGinitie tests indicates that Caucasian students are high on all tests (see Table 8). Black students score low on all tests, but are within four or less percentage points from Native American (Menominee) students on both the Validation and Retention tests.

Conclusions

Though Caucasian students tended to offer more categories and words to their maps than either of the other groups, further analyses indicated that there were differences in the numbers of students mentioning various categories and classifications of words. These differences may reflect cultural differences among the three groups. For example, there were significant differences among groups in the number of students who offered words which fit the Jungle/Zoo classification. Black students reported Jungle/Zoo animals most frequently. Additionally, information from the follow-up interview suggests that Native American

Table 7

Relationship of Word Association

and Retention Frequencies

	Treatment Group						
	Native American (Menominee) (N = 15)		Black (N = 10)		Caucasian (N = 16)		
	Number	Percent	Number	Percent	Number	Percent	Chi Square
Target/Test Words[a]	75		50		80		
Associations	36	48	33	66	68	85	23.93
Correct Responses on Retention Test	65	86.67	43	86	78	97.5	7.16

[a]Number of target/test words varies because it is based on number of students responding to test words, and some students were absent during post-testing.

Table 8

Results of Validation, Retention and

Gates MacGinitie Vocabulary Subtest

Test	Student Performance	Treatment Group: Native American (Menominee)	Black	Caucasian
Validation		(N = 36)	(N = 38)	(N = 38)
	% Correct	24.56	23.46	40.49
Retention		(N = 17)	(N = 12)	(N = 24)
	% Correct	76.75	73	86.8
Gates MacGinitie Vocabulary Subtest		(N = 17)	(N = 12)	(N = 24)
	Normal Curve Equivalent	39.82	33.25	61.04
	Percentile Rank	32	21	70.66
	Grade Equivalent	5.1	4.3	7.37

(Menominee) students have only vicarious knowledge of the source of the jungle/zoo animals on their maps, whereas Blacks and Caucasians have direct as well as vicarious knowledge of these words.

Although no significant differences among the number of students who reported woodland animal categories were found, Native American (Menominee) students offered the highest percentage of direct knowledge explanations as the source of these kinds of words.

Differences such as these can probably best be explained by location (rural/urban) differences among the groups. Quite simply, if you live in a woodland area (as do these particular Native American [Menominee] students), it's more likely that you will have direct contact with woodland animals. If you live near a major zoo (as do these particular Black and Caucasian students), you may have a greater opportunity to have direct contact with jungle/zoo animals.

Other differences such as the tendency of Caucasian students to mention geographic locations as places of recreation may be partially explained by the fact that this particular Caucasian population is representative of upper-middle class socio-economic status which makes it financially possible for them to travel to distant cities.

Environment could well dictate whether one includes rafting or canoe riding as types of recreation. The Native American (Menominee) students who reported these activities live in an environment where the kind of activity can be fostered.

Then again, it's difficult to separate all of the differences and explain them in such a simplistic fashion. More likely all of these

factors interact in various degrees along with that more nebulous factor called cultural background. Given a particular group's cultural background all of these factors most likely intertwine.

Results from follow-up target word association interview data from all maps show that Caucasian students are more likely to make associations between target words and their suggested words than the other two treatment groups. Additionally, Caucasian students are most likely to score highest on retention test items. Perhaps making associations facilitates retention of target word meanings. Since Caucasian students suggested more categories and words than the other groups, they have more opportunity to make associations with target words. Also, results are confounded by data which show that Caucasians also score high on the validation test. T-tests will be performed on interval data from the validation and retention tests, and the baseline standardized vocabulary subtest to determine if real differences between association and retention exist.

An indication of a positive effect of association on correct target word response is discernable. Retention test scores from students who participated in follow-up interviews were 10 to 13 percentage points higher than the scores obtained when these students' scores were combined with scores from students who were not interviewed. This may be another indication of the effect of association on correct response to target words. If students are given an opportunity to associate known and unknown words, they may be more likely to recall the unknown words at some future point. It is possible, too, that this percentage

difference could be a contamination effect caused by the interview process.

However, results from the within group analyses of potential relationships between association and correct recall of target words indicates that both Caucasian and Black groups are more likely to recall an unknown word correctly if they associate it with words which they've generated.

Though not definitive, data suggest that students are more likely to correctly recall the meaning of an unknown word if they associate it with a word which they've generated. Vocabulary instruction which provides opportunities for students to associate unknown words with words they've generated should help them learn the unknown words.

Analysis of animal map interview data seem to indicate that students in all treatment groups are more likely to expand their vocabularies by relating unknown words not simply to known words, but more specifically to known words with which they have a direct knowledge background. This might indicate that students could benefit from vocabulary instruction which provides direct or concrete experience with vocabulary words whenever possible. Also, teachers could help students make associations between unknown words and words with which students have a direct knowledge background. The semantic mapping instructional technique used in this study provides many opportunities for teachers to draw out these kinds of associations.

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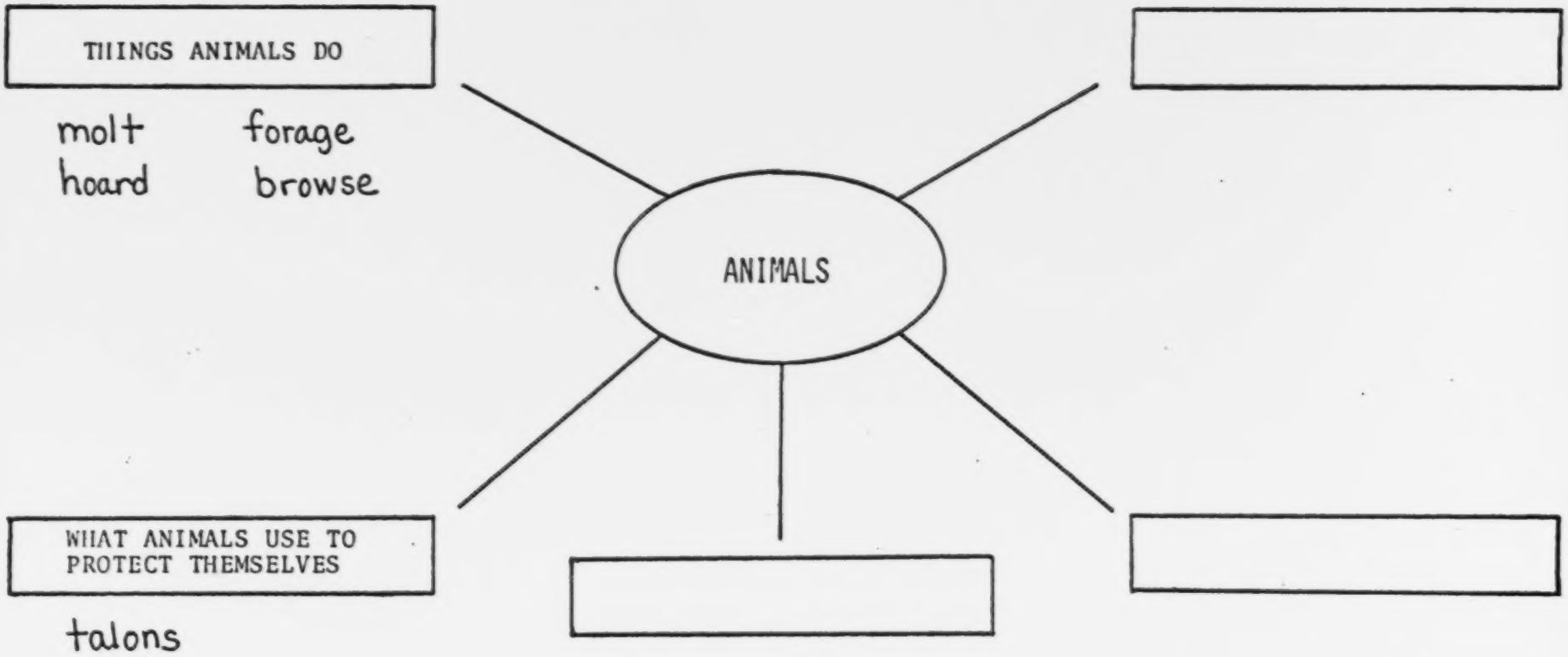
Appendix A

Semantic Maps

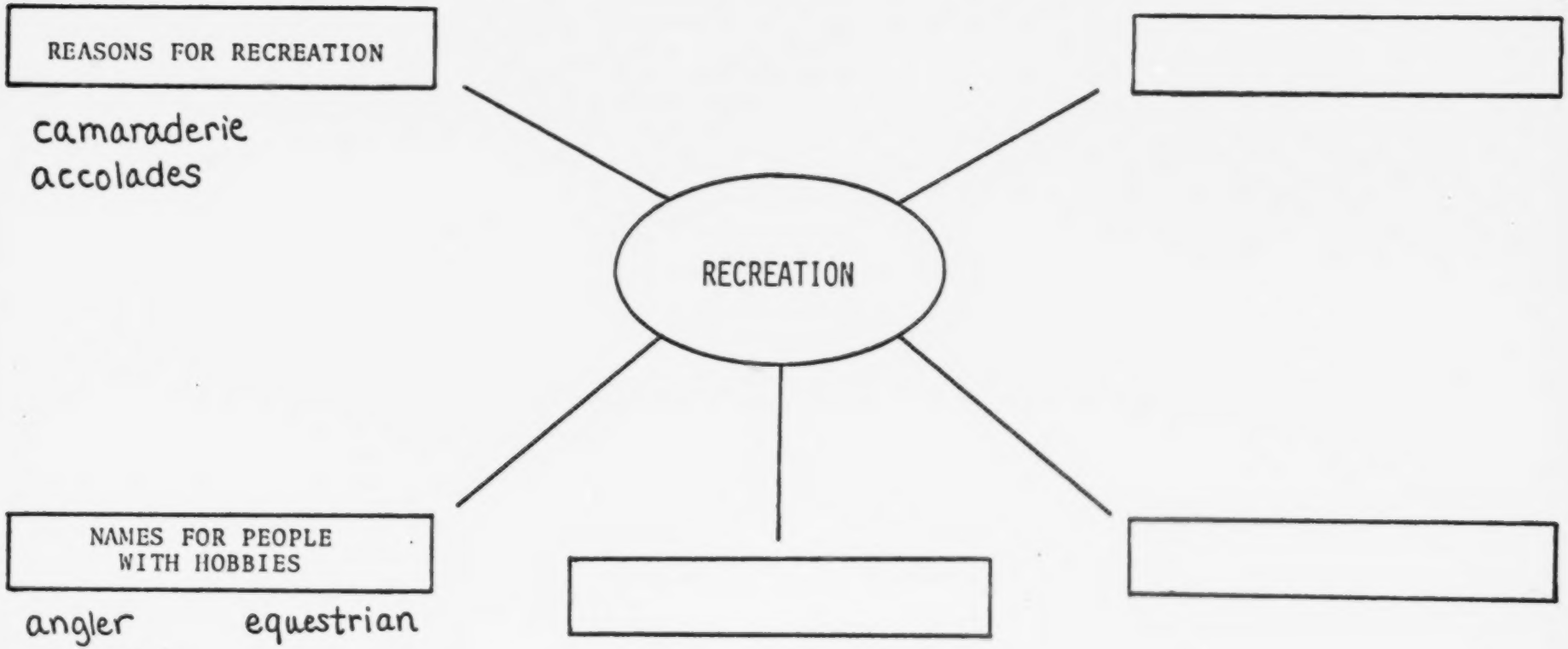
Name _____

School _____ Grade ___



Name _____

School _____ Grade ___

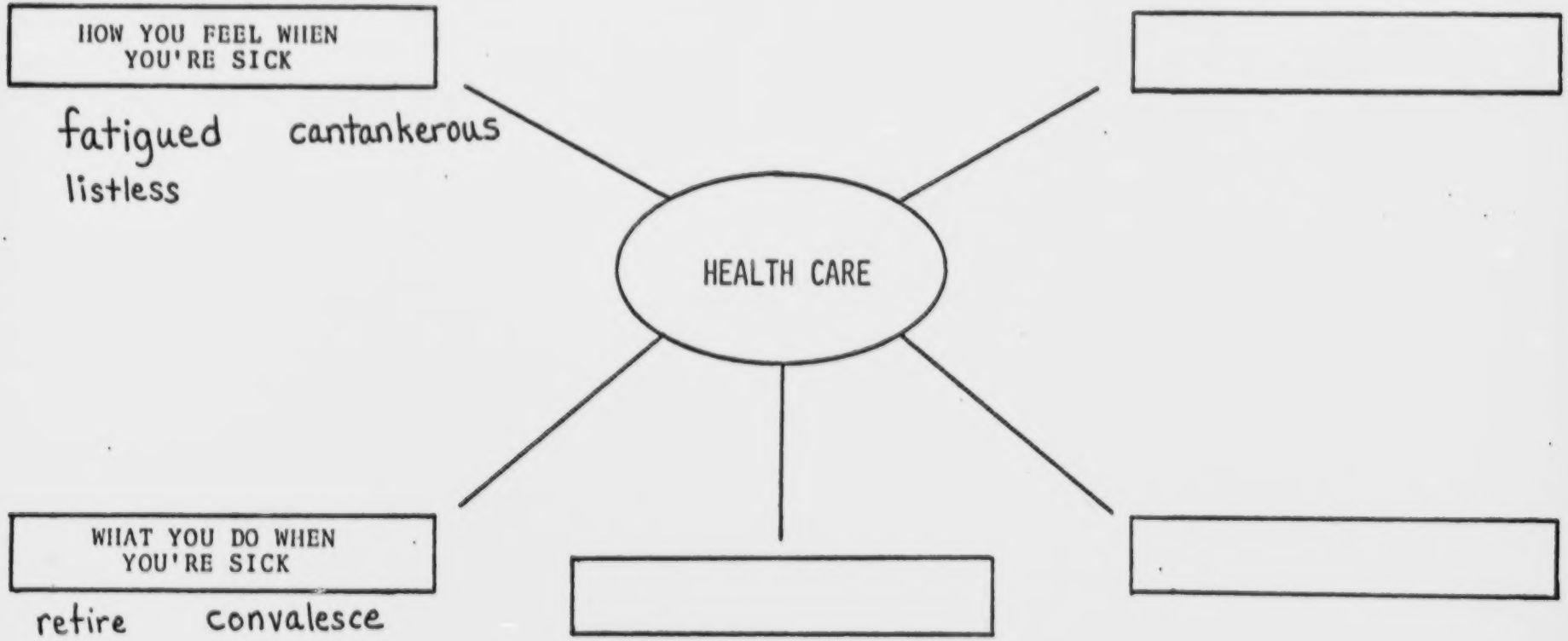


WISCONSIN RESEARCH & DEVELOPMENT CENTER

Lesson 3

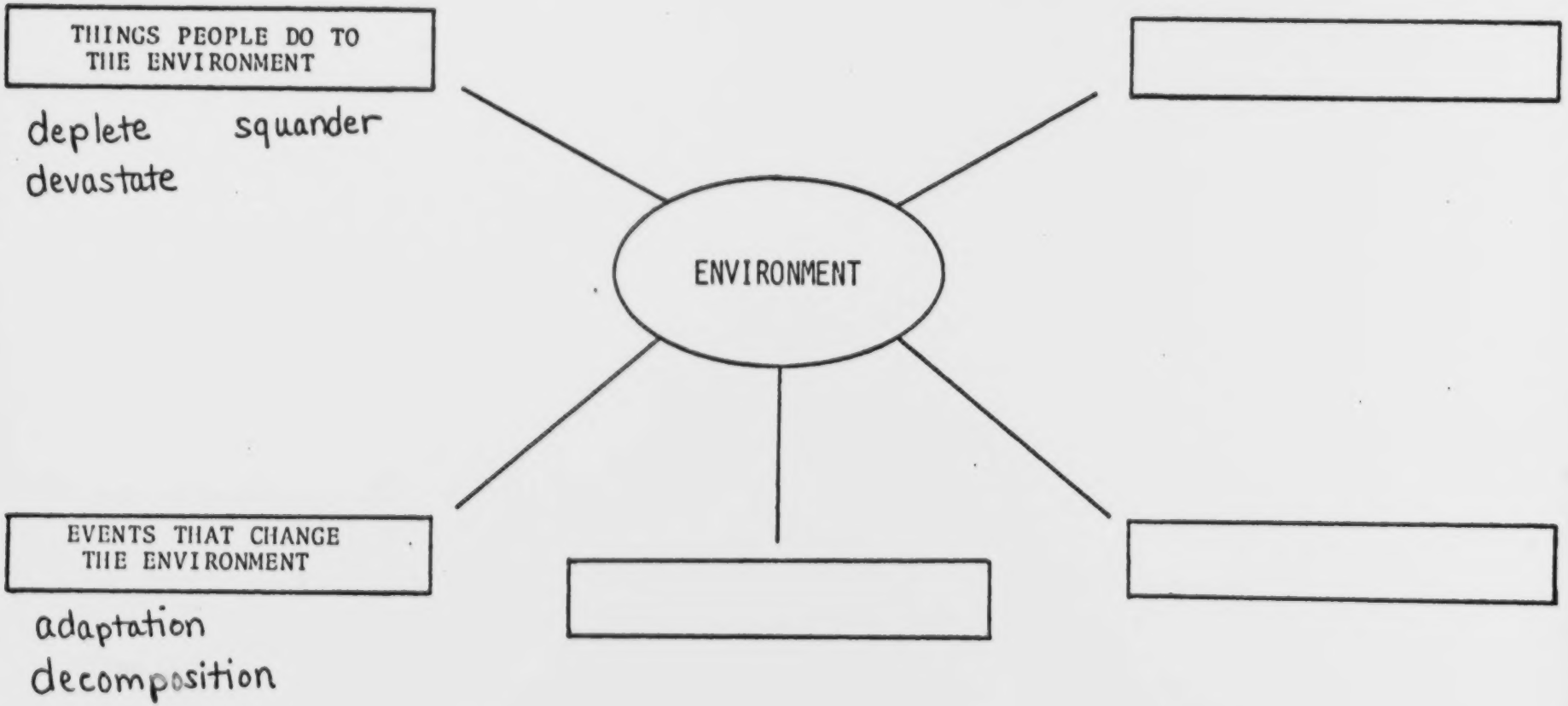
Name _____

School _____ Grade ___



Name _____

School _____ Grade ____



Appendix B

Validation Test and Directions for Administration

DIRECTIONS FOR ADMINISTRATION

Write the following on the chalkboard:

A. cozy

_____ a. lazy
_____ b. warm and comfortable
_____ c. crowded
_____ d. a pleasant smell

Explain to the children that they have been chosen to be the first students to take a special vocabulary test that was developed at the University of Wisconsin in Madison. Tell them that the people who developed the test are trying to identify words which seventh grade students do not know. Therefore, many of the words may be quite difficult for them. Tell the children not to get discouraged if they do not know some of these words--just to try to do their best work.

Give each child a booklet and have him or her complete the following information below on the front cover. (We need this information to be able to provide you with test results; the anonymity of the students will be maintained.)

Name (first and last)
Sex (indicate boy or girl)
School
Grade
Teacher

After all of the children have finished, have them turn back the cover page to the Practice Page.

Have the children read the directions at the top of the page to themselves while you read them aloud:

> "Read the vocabulary word. Underneath that word there are four word choices. Read each of those word choices and find the one that is closest in meaning to the vocabulary word. Then put a check mark (✓) in front of your answer."

Then direct their attention to the item written on the chalkboard.

Choose a child to read aloud the vocabulary word cozy and the four word choices beneath it. Then have the child identify the word choice that is closest in meaning to the word cozy. Put a check (✓) in front of the correct answer (warm and comfortable).

Have the children do the three practice items on the page independently. Then review the answers with them.

1. discard
   - ✓ a. to throw away
   - ____ b. to write a letter
   - ____ c. to save
   - ____ d. to disapprove

2. option
   - ____ a. a group of plants
   - ____ b. lack of opportunity
   - ✓ c. freedom of choice
   - ____ d. a completed operation

3. ravel

____ a. prepare dinner
____ b. mend clothes
____ c. make ravioli
✓ d. undo woven material

After the children have completed the three Practice Items, explain that they are now going to be doing the rest of the items on their own. Direct the children's attention to the sentences underneath the Practice Items and read the information aloud to them:

> "Some of these vocabulary words may seem hard because we want to know which words you know and which words you don't know. Please try to do your best job answering each item."

Remind the children that for each item, they should read the vocabulary word and then decide which one of the four words beneath it is closest in meaning to the word at the top, and put a check (✓) next to their answer.

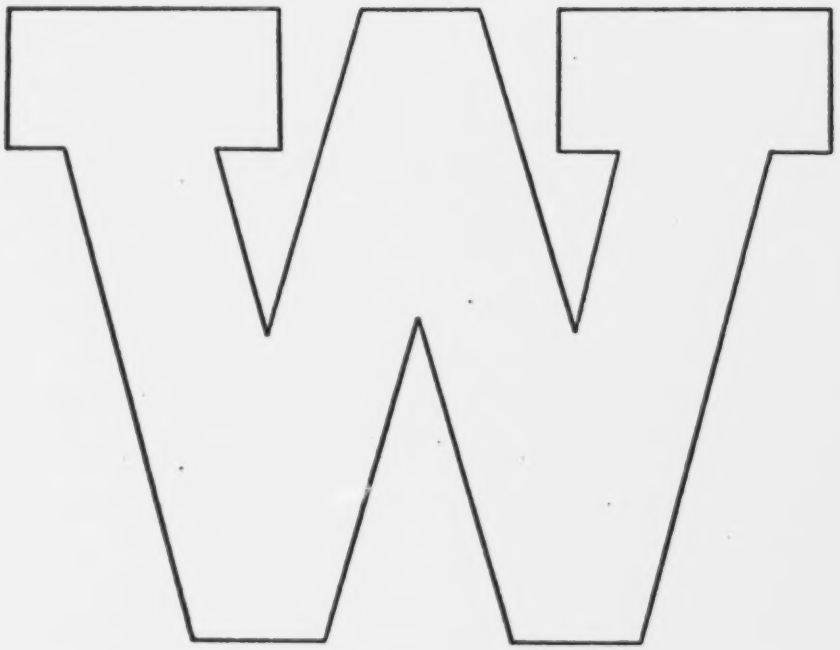
Tell the children that since the developers of the test are trying to find out which words seventh grade children do and do not know how to read, you are not allowed to read any of the words for them.

Tell your students that there is a total of five pages and when they have finished all five pages they should go back and check that they have done every item in each of the five pages. Remind the children again that the test is intended to be very hard so they should not get discouraged. Tell them, though, that it is very important that they try their best. If they do not know an answer, they should guess.

Direct the children to turn to Page One and begin.

The test should take approximately 25-35 minutes for completion. Let the children complete the test at their own pace.

Remember, do not help the children read any of the words in the test items.



Vocabulary Test

NAME _____
FIRST LAST

GIRL ☐
BOY ☐

SCHOOL _____ GRADE _____

TEACHER _____

Read the vocabulary word. Underneath that word there are four word choices. Read each of those word choices and find the one that is closest in meaning to the vocabulary word. Then put a check mark (✓) in front of your answer.

1. discard

_____ a. to throw away

_____ b. to write a letter

_____ c. to save

_____ d. to disapprove

2. option

_____ a. a group of plants

_____ b. lack of opportunity

_____ c. freedom of choice

_____ d. a completed operation

3. ravel

_____ a. prepare dinner

_____ b. mend clothes

_____ c. make ravioli

_____ d. undo woven material

Some of these vocabulary words may seem hard because we want to know which words you know and which words you don't know. Please try to do your best job answering each item.

TURN TO PAGE ONE

1

1. camouflage

_____ a. false appearance

_____ b. desert animal

_____ c. bad habit

_____ d. camp flag

2. alleviate

_____ a. feel

_____ b. allow

_____ c. make stronger

_____ d. make easier

3. browse

_____ a. nibble grass

_____ b. choose

_____ c. brush

_____ d. plant crops

4. equestrian

_____ a. person who walks everywhere

_____ b. person who delivers equipment

_____ c. person who trains dogs

_____ d. person who rides a horse

5. listless

_____ a. lacking energy

_____ b. crabby

_____ c. without a care

_____ d. sad

6. acclaim

_____ a. advice

_____ b. contest

_____ c. praise

_____ d. accident

7. talons

_____ a. fish scales

_____ b. lion's den

_____ c. tail of a fox

_____ d. claws of a bird

8. molt

_____ a. shrink

_____ b. shed

_____ c. grow

_____ d. mold

9. restrain

_____ a. waste

_____ b. rest again

_____ c. hold back

_____ d. refill

10. venom

_____ a. thief

_____ b. bite

_____ c. vent

_____ d. poison

TURN TO PAGE TWO

11. retire

_____ a. refuse

_____ b. retake

_____ c. go to bed

_____ d. go to work

12. tremor

_____ a. shaking

_____ b. spill

_____ c. travel

_____ d. covering

13. adaptation

_____ a. removal of water

_____ b. adoption

_____ c. reaching out

_____ d. changing to fit

14. angler

_____ a. person who sews

_____ b. angel

_____ c. diver

_____ d. person who fishes

15. diagnose

_____ a. enter

_____ b. explain how to use

_____ c. dig

_____ d. find the cause

16. hoard

_____ a. hobble

_____ b. discard

_____ c. heard

_____ d. collect

17. gratification

_____ a. pleasure

_____ b. discovery

_____ c. vacation

_____ d. hunger

18. decomposition

_____ a. story

_____ b. compound

_____ c. growth

_____ d. rotting

19. rivalry

_____ a. trying to outdo

_____ b. cleaning a rifle

_____ c. deciding to go

_____ d. meeting a friend

20. slither

_____ a. sink

_____ b. skip

_____ c. sleep

_____ d. slide

TURN TO PAGE THREE

21. diversion

_____ a. accident

_____ b. change from the usual

_____ c. excuse for being late

_____ d. divorce

22. fatigued

_____ a. thin

_____ b. tired

_____ c. fat

_____ d. wonderful

23. devastate

_____ a. develop

_____ b. deliver

_____ c. destroy

_____ d. demonstrate

24. erosion

_____ a. explosion

_____ b. slowly wearing away

_____ c. bringing together

_____ d. full of power

25. lethargic

_____ a. lack of energy

_____ b. strange

_____ c. feeling grouchy

_____ d. magical

26. camaraderie

_____ a. danger

_____ b. friendship

_____ c. commander-in-chief

_____ d. leadership

27. conjurer

_____ a. athlete

_____ b. comedian

_____ c. magician

_____ d. author

28. plague

_____ a. playground

_____ b. something unlawfully copied

_____ c. moving from one place to another

_____ d. sudden outbreak

29. squander

_____ a. twist

_____ b. squat

_____ c. replant

_____ d. waste

30. cantankerous

_____ a. strong

_____ b. cowardly

_____ c. silly

_____ d. grumpy

PLEASE TURN TO PAGE FOUR

31. ornithologist

_____ a. person who works in a greenhouse

_____ b. person who plays in an orchestra

_____ c. person who studies birds

_____ d. person who raises horses

32. deplete

_____ a. use up

_____ b. deposit

_____ c. dig a hole

_____ d. protect

33. tedium

_____ a. anger

_____ b. exercise

_____ c. teamwork

_____ d. boredom

34. ordinance

_____ a. discussion

_____ b. rule

_____ c. ornament

_____ d. punishment

35. recuperate

_____ a. reduce the speed

_____ b. get back health

_____ c. retell a story

_____ d. record a song

36. regeneration

_____ a. recalling cars

_____ b. forming again

_____ c. owing rent

_____ d. renaming

37. fault

_____ a. slice of meat

_____ b. fraction of a second

_____ c. rip in clothing

_____ d. break in earth's surface

38. statute

_____ a. state

_____ b. law

_____ c. monument

_____ d. message

PLEASE TURN TO PAGE FIVE

39. accolades

_____ a. collars

_____ b. banners

_____ c. colors

_____ d. honors

40. forage

_____ a. forget

_____ b. search for food

_____ c. replant a forest

_____ d. buy

41. convalesce

_____ a. run around

_____ b. get well

_____ c. convince

_____ d. watch television

PLEASE GO BACK AND CHECK THAT YOU HAVE DONE EVERY ITEM IN THIS BOOKLET.

THANK YOU

Appendix C

Lesson Plan Sample--Animals

LESSON PLAN

OBJECTIVE: To introduce new vocabulary words including the following five target words:

1) talons -- the claw of an animal and especially of a bird of prey; The eagle used its talons to grab the snake.
2) molt -- to shed a coat of skin or feathers; There are feathers all over the cage when my parakeets molt.
3) hoard -- to collect or store up for future use; Squirrels hoard acorns for the winter.
4) forage -- to hunt or search for food; I don't like rabbits to forage in my garden.
5) browse -- to feed on as in graze; Deer browse on twigs in the forest.

MATERIALS

One transparency of the Semantic Map for Animals

One copy of the Semantic Map for Animals for each child

PROCEDURE

1. Introduction
   a. Explain to the children that they are going to be working on a semantic map for the word animals.
   b. Tell the children that there are a lot of different words that go with the word animals and these words can be classified into many categories.

c. Show the children the two categories written on the transparency.

d. Explain that several words are written under each category.

2. Definition of Target Words and Other Unfamiliar Words (10 minutes)

a. Discuss the meanings of the words written in the categories.

b. Point to the category "What Animals Use to Protect Themselves" and direct the children's attention to the word talons. Tell the children the meaning of the word (claws) and then briefly discuss the word. Explain that some birds use their talons to fight other birds.

c. Point to the category "Things Animals Do" and ask if anyone knows the meaning of the word molt. Tell the children the meaning of the word (to shed skin, hair, shells, horns, or feathers) and then briefly discuss the word (e.g., read the sentence provided under "objective").

d. Point out the word forage and ask if anyone knows the meaning of the word. Explain that forage means to hunt or search for food. Briefly discuss the word forage (e.g., read the sentence provided).

e. Draw the children's attention to the word hoard. Discuss and define the word using a similar procedure. Be sure to point out in the discussion that while hoard means to store food, it does not mean to look for food as forage does.

f. Point out the word browse. Explain that browse means to graze. Briefly discuss the word browse (e.g., read the sentence provided).

g. Ask the children if there are any other words on the map that they do not know the meaning of. (If there are, discuss those words.)

h. Review the names of the two categories written on the transparency.

3. Independent Work (10 minutes)

Give the children a map for "Animals" just like the one on the transparency and tell them to add more categories and also to add more words to each category. Expalin that they will have ten minutes to complete their work.

4. Collect Children's Work

Have the children check that their name is on their map and then collect the maps.

5. Review of Target Words and Other Unfamiliar Words the Following Day Prior to the Introduction of the Topic Recreation

a. Review the five target words as well as any other difficult words. Discuss each of these words using some of the following techniques:

synonyms -- let the children suggest other words that have a similar meanings

antonyms -- let the children suggest words that have an opposite meaning

sentences -- have the children use the word in a sentence

cross-category comparisons -- relate words in one category to those in another (e.g., discuss specific animals in terms of the words listed under the categories "Things Animals Do" and "What Animals Use to Protect Themselves."

Allow the discussion to be fairly unstructured within the time constraints.

Appendix D

Interview Protocol

Interview Protocol

I. Opening--Establish Rapport, Set Purpose

Remember this morning I told you that some of my friends and I at the University are trying to find out what kinds of vocabulary lessons children like. Now I'd like to spend some time alone with you so we can talk about just your map and the words (and categories) you have added. You've added some very interesting words (and categories) to your map.

II. Establish Source of Elicited Words

A. Tell me how you thought of the words and categories you've added to your map.

(An open ended probe was selected to encourage student response, and avoid monotony. Also, open ended responses might be systematically different from those which are specifically solicited.)

1. Attend to Student Responses Which Require Additional Probes

a. I don't know. I don't remember.

1) Follow-up probe

a) Well, maybe you don't know for sure, but what do you think?

b) I don't have to know exactly, what are your best guesses?

b. Silence

1) Follow-up probe

a) I realize the question might be difficult to answer without some careful thought.

B. Use the following probe for elicited words which students do not discuss in "A." Tell me how you thought of this word (category).

III. Provide Transition

You've told me a lot about the words on your map. That's just great!

IV. Determine How Subjects Bridged Elicited Words to Target Words

A. Now tell me how some of your words and/or categories helped you to learn the new words.

(This may be a leading probe, however the question form of this probe [i.e., Did some of your words and/or categories help you learn the new words?] would permit a yes/no response and experience has shown that when students are give this option they usually answer "no.")

B. Use the following probe for target words which students do not discuss in "A." Tell me how some of your words and/or categories helped you to learn the new word.

V. Allow Students Opportunity to Add Any Unsolicited Information

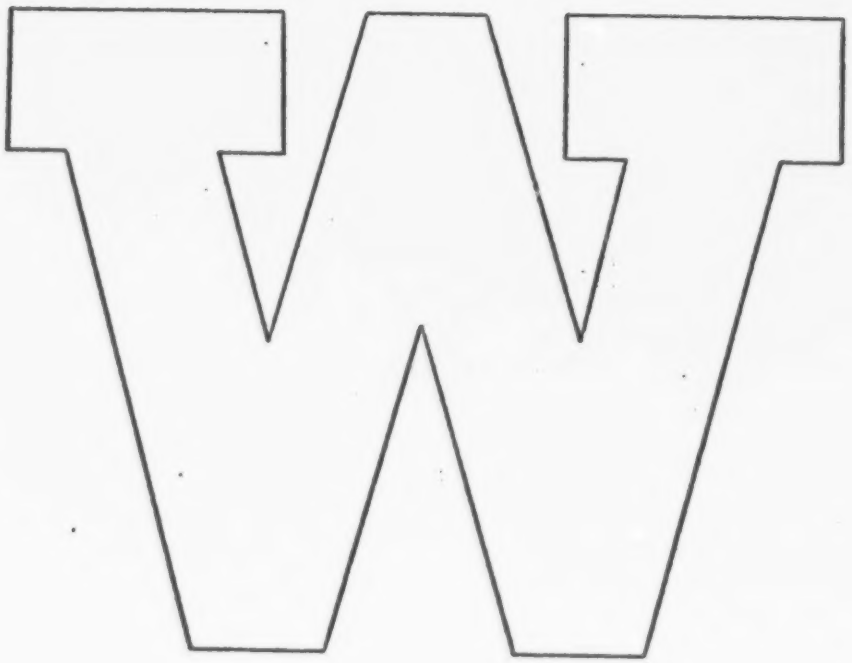
Is there anything else you would like to tell me about the map?

VI. Close Interview

Did you like this lesson about (e.g., animals)?

Appendix E

Retention Test



Vocabulary Test

NAME _____ GIRL ☐
FIRST LAST BOY ☐

SCHOOL _____ GRADE _____

TEACHER _____

Read the vocabulary word. Underneath that word there are four word choices. Read each of those word choices and find the one that is closest in meaning to the vocabulary word. Then put a check mark (✓) in front of your answer.

1. elect

_____ a. to throw away

_____ b. to write a letter

_____ c. to choose

_____ d. to save

2. polite

_____ a. a group of plants

_____ b. bad luck

_____ c. good manners

_____ d. an operation

3. discover

_____ a. to cover up

_____ b. to lose

_____ c. to grow

_____ d. to find

TURN TO PAGE ONE

1. browse

_____ a. nibble grass

_____ b. choose

_____ c. brush

_____ d. plant crops

2. equestrian

_____ a. person who walks everywhere

_____ b. person who delivers equipment

_____ c. person who trains dogs

_____ d. person who rides a horse

3. listless

_____ a. lacking energy

_____ b. crabby

_____ c. without a care

_____ d. sad

4. talons

_____ a. fish scales

_____ b. lion's den

_____ c. tail of a fox

_____ d. claws of a bird

5. molt

_____ a. shrink

_____ b. shed

_____ c. grow

_____ d. mold

6. retire

_____ a. refuse

_____ b. retake

_____ c. go to bed

_____ d. go to work

7. adaptation

_____ a. removal of water

_____ b. adoption

_____ c. reaching out

_____ d. changing to fit

8. angler

_____ a. person who sews

_____ b. angel

_____ c. diver

_____ d. person who fishes

9. hoard

_____ a. hobble

_____ b. discard

_____ c. heard

_____ d. collect

10. decomposition

_____ a. story

_____ b. compound

_____ c. growth

_____ d. rotting

TURN TO PAGE TWO

11. fatigued

_____ a. thin

_____ b. tired

_____ c. fat

_____ d. wonderful

12. devastate

_____ a. develop

_____ b. deliver

_____ c. destroy

_____ d. demonstrate

13. camaraderie

_____ a. danger

_____ b. friendship

_____ c. commander-in-chief

_____ d. leadership

14. conjurer

_____ a. athlete

_____ b. comedian

_____ c. magician

_____ d. author

15. squander

_____ a. twist

_____ b. squat

_____ c. replant

_____ d. waste

16. cantankerous

_____ a. strong

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_____ c. silly

_____ d. grumpy

17. deplete

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_____ b. deposit

_____ c. dig a hole

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18. accolades

_____ a. collars

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19. forage

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_____ b. search for food

_____ c. replant a forest

_____ d. buy

20. convalesce

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_____ c. convince

_____ d. watch television

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